

OPERATIVE PRODUCTS OFFERED BY LAMP (LABORATORIO ARGENTINO DE METEOROLOGÍA DEL ESPACIO) IN ARGENTINA

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RESUMEN

La física solar-terrestre es una disciplina científica ampliamente desarrollada en Argentina desde hace varias décadas. Recientemente, Argentina también comenzó a desarrollar actividades operativas en Meteorología del Espacio (ME). En este trabajo describimos las actividades que desde comienzo de 2016 son llevadas a cabo por investigadores del grupo LAMP (Laboratorio Argentino de Meteorología del espacio) pertenecientes a tres instituciones: del Departamento de Ciencias de la Atmósfera y los Océanos de la Universidad de Buenos Aires (DCAO-UBA), del Servicio Meteorológico Nacional (SMN) y del Instituto Antártico Argentino (IAA). Desde 2014 el grupo LAMP participó en un programa de cursos sobre aspectos operativos en ME, y han desarrollado el primer portal argentino (spaceweather.at.fcen.uba.ar) en español con información actualizada de las condiciones y pronóstico en ME. Finalmente, desde 2016, se ha comenzado a monitorear diariamente la información en tiempo real sobre las condiciones de ME. La información es analizada por cada participante y discutida durante las reuniones mensuales (*Briefings*). Un informe final es realizado cada semana como resumen de la actividad ocurrida. En este trabajo presentamos un ejemplo de las condiciones analizadas del 06 al 10 de septiembre de 2017.

ABSTRACT

For many years Argentina is developing a large amount of different research activities in Space Physics and Sun-Earth connection, with a significant participation on the international scientific community. Recently, Argentina also started activities on Operative Space Weather. In this work we describe activities developed since beginning 2016, carried out by researchers of the group LAMP (Laboratorio Argentino de Meteorología del espacio), belonging to three institutions: Departamento de Ciencias de la Atmósfera y los Océanos at Universidad de Buenos Aires (DCAO-UBA), Servicio Meteorológico Nacional (SMN), and Instituto Antártico Argentino (IAA). Since 2014 they participated in a programme of courses on Operative Space Weather and have developed the first Argentine portal (spaceweather.at.fcen.uba.ar) in Spanish. Finally, since 2016, we started a daily monitoring of real-time information on the conditions in Space Weather. The information is analyzed by each participant and discussed later, during monthly meetings (*briefings*). A final weekly report is done as a resume of the space weather activity. We present here an example of the conditions analysed from 06 to 10 September 2017.

Palabras clave: Operative Space Weather, Geomagnetic Storm, Coronal Mass Ejection.

1) INTRODUCTION

The number of countries that carry out operative Space Weather (SWx) activities has been growing significantly in the recent years. Several international institutions, as for instance the World

Meteorological Organization (WMO), the International Civil Aviation Organization (ICAO), the United Nations Office for Outer Space Affairs (UNOOSA), have begun to develop programs and activities on Space Weather, some of them with the aim of having answers to the negative effects of extreme SWx events. A review of the Space Weather activities in Latin America can be found in Denardini et al., (2016a); Denardini et al., (2016b); Denardini et al., (2016c). At the beginning of 2016, our laboratory on SWx in Argentina (LAMP: Laboratorio Argentino de Meteorología del esPacio) started to develop a daily monitoring of real-time information on the SWx conditions. In the next section we present an example (SWx conditions during 6-10 September 2017) of the detailed analysis developed during these activities.

2) 7-8th SEPTEMBER 2017 GEOMAGNETIC STORM

The active region 12673 produced a serie of X-Class solar flares (i.e. X ray Flux $>10^{-4}$ Watts/m²) during September 2017. In particular, the solar flare of 06/Sep (X9.3) was the largest solar flare from the Solar Cycle 24. This flare was also associated with a Coronal Mass Ejection (CME) launched from the Sun toward Earth (Figure 1a). The shock of the CME arrived at the Earth on 08/Sep and the geomagnetic field was highly perturbed. The Kp index indicates a measure of the perturbation of the geomagnetic field, and has a logarithmic scale from 1 (quiet conditions) to 9 (strong geomagnetic storm). During this event, the Kp index reached a value of Kp=8 (i.e G4 geomagnetic storm) between 21 UT 07/Sep to 03 UT 08/Sep (Figure 1b.). The ionosphere is perturbed by the solar X-ray flux and the geomagnetic storm. Figure 1c shows the Total Electron Content (TEC) on 8th/Sep in a TEC map developed by LAMP, and operative available at spaceweather.at.fcen.uba.ar. In the north of Argentina TEC presents an increase of 150% due to the G4 geomagnetic Storm.

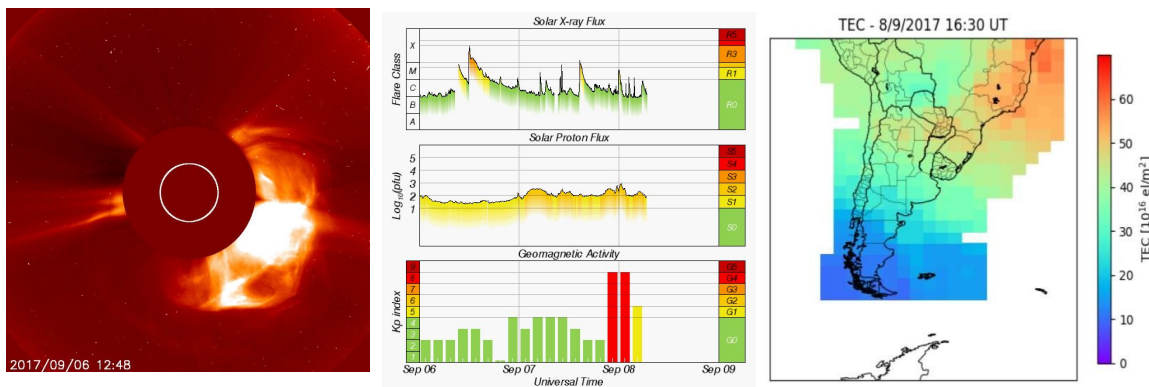


Figure 1: LASCOCO2 Coronal Mass Ejection (left). NOAA storm observations (middle). Map of Total electron content in Argentina (right). This maps are available in the operative website developed by LAMP (spaceweather.at.fcen.uba.ar)

Operative Space Weather products are of great importance because Space Weather events can affect aviation communications, global positioning systems, grid electric power, satellite technologies, and human health in space.

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